Mining engineers often spend time outdoors at work sites.

Employment
Mining engineers held about 4,400 jobs in 1998. While one-half worked in the mining industry, other mining engineers worked in government agencies, manufacturing industries, or engineering consulting firms.

Mining engineers are usually employed at the location of natural deposits, often near small communities, and sometimes outside the United States. About one-third of mining engineers employed in the U.S. work in Nevada, Colorado, Arizona, West Virginia, and Wyoming. Those in research and development, management, consulting, or sales, however, are often located in metropolitan areas.

Job Outlook
Employment of mining engineers is expected to decline through 2008. Most of the industries in which mining engineers are concentrated—such as coal, metal, and mineral mining, as well as stone, clay, and glass products manufacturing—are expected to experience declines in employment.

Although there are no job openings expected to result from employment growth, there should be openings resulting from the need to replace mining engineers who transfer to other occupations or leave the labor force. A large number of mining engineers currently employed are approaching retirement age. In addition, there are a relatively small number of schools offering mining engineering programs, and the small number of graduates is not expected to increase.

Mining operations around the world recruit graduates of U.S. mining engineering programs. Consequently, job opportunities may be better worldwide than within the United States. As a result, graduates should be prepared for the possibility of frequent travel or even living abroad.

Earnings
Median annual earnings of mining engineers were $56,090 in 1998. The middle 50 percent earned between $43,350 and $75,650. The lowest 10 percent earned less than $34,930 and the highest 10 percent earned more than $87,380. In the Federal Government, mining engineers in supervisory, nonsupervisory, and management positions averaged $62,300 a year in early 1999.

According to a 1999 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in mining engineering received starting offers averaging about $39,600 a year.

(See introduction to the section on engineers for information on working conditions, training requirements, and sources of additional information.)

Nuclear Engineers

(O*NET 22117)

Nature of the Work
Nuclear engineers research and develop the processes, instruments, and systems used to derive benefits from nuclear energy and radiation. They design, develop, monitor, and operate nuclear plants used to generate power. They may work on the nuclear fuel cycle—the production, handling, and use of nuclear fuel and the safe disposal of waste produced by nuclear energy—or on fusion energy. Some specialize in the development of nuclear power sources for spacecraft; others develop industrial and medical uses for radioactive materials, such as equipment to diagnose and treat medical problems.

Employment
Nuclear engineers held about 12,000 jobs in 1998. About 60 percent were in utilities, the Federal Government, and engineering consulting firms. More than half of all federally employed nuclear engineers were civilian employees of the Navy, and most of the rest worked for the Department of Energy or the Tennessee Valley Authority. Most nonfederally employed nuclear engineers worked for public utilities or engineering consulting companies. Some worked for defense manufacturers or manufacturers of nuclear power equipment.

Many nuclear engineers work for public utilities.

Job Outlook
Good opportunities should exist for nuclear engineers because the small number of nuclear engineering graduates is likely to be in rough balance with the number of job openings. Because this is a small occupation, projected job growth will generate few openings; consequently, most openings will result from the need to replace nuclear engineers who transfer to other occupations or leave the labor force.

Employment of nuclear engineers is expected to grow more slowly than the average for all occupations through 2008. Due to public concerns over the cost and safety of nuclear power, there are no commercial nuclear power plants under construction in the United States. Nevertheless, nuclear engineers will be needed to operate existing plants. In addition, nuclear engineers will be needed to work in defense-related areas, to develop nuclear medical technology, and to improve and enforce waste management and safety standards.

Earnings
Median annual earnings of nuclear engineers were $71,310 in 1998. The middle 50 percent earned between $57,160 and $85,460. The lowest 10 percent earned less than $48,830 and the highest 10 percent earned more than $106,400. In the Federal Government, nuclear engineers in supervisory, nonsupervisory, and management positions averaged $67,100 a year in early 1999.

(See introduction to the section on engineers for information on working conditions, training requirements, and sources of additional information.)

Petroleum Engineers

(O*NET 22111)

Nature of the Work
Petroleum engineers search the world for reservoirs containing oil or natural gas. Once discovered, petroleum engineers work with geologists and other specialists to understand the geologic formation and properties of the rock containing the reservoir, determine the drilling methods to be used, and monitor drilling and production operations. They design equipment and processes to achieve the maximum profitable recovery of oil and gas, often using computer models to simulate reservoir performance using different recovery techniques.

Because only a small proportion of oil and gas in a reservoir will flow out under natural forces, petroleum engineers develop and use various enhanced recovery methods. These include injecting water, chemicals, gases, or steam into an oil reservoir to force more of the oil out, and computer-controlled drilling or fracturing to connect a larger area of a reservoir to a single well. Since even the best techniques in use today recover only a portion of the oil and gas in a reservoir, petroleum engineers research and develop technology and methods to increase this proportion and lower the cost of drilling and production operations.

Employment
Petroleum engineers held about 12,000 jobs in 1998, mostly in the oil and gas extraction, petroleum refining, and related industries. Employers include major oil companies and hundreds of smaller, independent oil exploration, production, and service companies. Engineering consulting firms and government agencies also employ petroleum engineers. Others work as independent consultants.

Most petroleum engineers work where oil and gas are found. Large numbers are employed in Texas, Louisiana, Oklahoma, California, and Colorado, including offshore sites. Many American petroleum engineers also work overseas in oil-producing countries. Because petroleum engineers specialize in the discovery and production of oil and gas, relatively few are employed in the transportation and retail sectors of the oil and gas industry.

Petroleum engineers are involved in many aspects of oil and gas extraction.

Job Outlook
Despite a projected decline in employment, opportunities for petroleum engineers should be favorable because the relatively small number of graduates is expected to be in rough balance with the number of job openings. Most opportunities will result from the need to replace petroleum engineers who transfer to other occupations or leave the labor force. Also, petroleum engineers work around the world, and many employers seek U.S.-trained petroleum engineers for jobs in other countries.

Employment of petroleum engineers is expected to decline through 2008 unless oil and gas prices unexpectedly rise enough to encourage increased exploration for oil in the United States. A high price of oil and gas makes it profitable for oil exploration and production firms to seek oil and gas reservoirs, and they will hire petroleum engineers to do so. Low oil prices, however, make it cheaper to purchase needed oil from other countries, such as Saudi Arabia, which have vast oil reserves. Also, the best exploration opportunities are in other countries because many of the most likely petroleum-producing areas in the United States have already been explored. However, the implementation of new technologies that expand drilling possibilities and improve the performance of reservoirs in the U.S. and the Gulf of Mexico may create new opportunities.

Earnings
Median annual earnings of petroleum engineers were $74,260 in 1998. The middle 50 percent earned between $56,020 and $93,280. The lowest 10 percent earned less than $42,870 and the highest 10 percent earned more than $115,820.

According to a 1999 salary survey by the National Association of Colleges and Employers, bachelor's degree candidates in petroleum engineering received starting offers averaging about $50,400.

(See introduction to the section on engineers for information on working conditions, training requirements, and sources of additional information.)